

Three EV myths debunked; Vehicles won't solve climate change on their own, but research shows they reduce emissions

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Body

Kirt Ejesiak is a technophile, an early adopter of new gadgets, and a northerner.

He's the CEO of a drone company in Iqaluit, surveying land and ice conditions around Baffin Island. Like many in the North, he's keenly aware of how climate change is affecting the land, the animals and the weather - and he wants to be part of the solution.

Ejesiak is constantly on the lookout for ways to incorporate newer, more efficient technologies into his business and personal life. And so, he wants an electric vehicle (EV).

"It would be great to check and test to see if this is something that would work in the North," he said.

There's only one problem.

"The electricity that goes into charging the electric car, you know, that's all diesel up here," he said. "So is that even better?"

If the electricity is made by burning diesel, why not just buy a truck and put the diesel straight in the gas tank?

Ejesiak's conundrum is one that many people considering buying an EV have faced. If the electricity used to charge the vehicle is generated from fossil fuels, are you even saving emissions by switching from a gas-powered car?

If you're wondering, don't go onto social media for answers. Twitter and Facebook are riddled with myths put out by EV skeptics. One of the biggest is the idea that EVs produce more emissions than gas-burning cars if they're charged on a carbon-heavy electrical grid.

The Star spoke to academics, researchers and other experts to put this myth, and others, to rest.

Myth No.1

EVs are worse for the climate

than gas cars if they're charged with dirty electricity

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EVs produce less emissions than gas-powered cars, regardless of how the electricity is generated, says Florian Knobloch, the lead author of one of the first academic studies to comprehensively quantify the emissions caused by charging an EV with different kinds of electricity mixes.

"To put it in the simplest possible way: almost everywhere it makes sense to go for electric cars," Knobloch told the Star.

"Even if you're on a grid with 100 per cent coal, doing an apples-to-apples comparison between a similar-sized petrol car and an electric car, the electric car would still marginally reduce emissions due to its high efficiency."

Electric motors are simply better at capturing the energy in the battery and using it to turn the wheels. According to Natural Resources Canada, 76 per cent of the energy in the battery of an EV goes to making the car move, while only 16 per cent of the energy contained in the gas tank of an average car powers that car forward. The majority of energy is lost through heat.

EVs are even more efficient when you factor in regenerative braking, which captures the friction in your brakes and feeds the energy back into the battery so it can be reused. This technology can increase the efficiency of EVs to between 87 and 91 per cent, according to the U.S. Department of Energy.

As a result, you get far more kilometres per unit of energy in an EV than you do in a regular car.

This efficiency advantage is so great that if Ejesiak wanted to do a real-world experiment, the EV would still come out on top. You'll get further in an EV with the electricity generated from one litre of diesel than you would by burning that same diesel in an engine (even though most of the energy in the litre of diesel is lost due to the inefficiency of a diesel generator).

You have to bend over backwards to find the extremely rare situations where this rule doesn't hold, Knobloch said.

"You will always find a very heavy, big electric car which might cause more emissions than a very small, efficient hybrid petrol car. But when you look at fleet averages, electric is always the better option."

Knobloch, who held positions at the University of Cambridge and Radboud University Nijmegen in the Netherlands before going to work for the German Ministry for Economic Affairs and Climate Action, published a landmark paper in 2020 that analyzed the emissions of switching to electric cars around the world.

The report contains an atlas of green and yellow countries where the switch to EVs would reduce emissions always or on average, with only a handful of red countries, like Poland and India, where emissions would rise with EVs, because they have the worst-polluting coal generation in the world.

"They don't only have coal power, but also rather old and inefficient coal power plants," he said. "So this drives emissions of electric cars through the roof."

However, these kinds of coal plants are on their way out, and in many cases they're being replaced by renewables and natural gas plants. And as these countries clean up their power, EVs bought today will benefit and become cleaner as they charge over the course of their lives, Knobloch says. In other words, they're future-proofed.

"When you buy a petrol car, you're stuck with its emission profile for its entire lifetime. Whereas when you buy an electric car now, even if it still has higher emissions in the next one or two years while the grid decarbonizes, you have that decarbonization automatically going into the car," he said.

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As the wave of renewables coming online grows - the International Energy Agency (IEA) found that more money currently flows into renewables than fossil fuels - these fleets of EVs will only get cleaner.

"With every additional percentage of renewables coming into the grid, you reduce emissions from electric vehicles bit by bit," said Knobloch.

But what about the batteries? EV doubters often point to the carbon emitted when mining and manufacturing the large batteries as an argument for why they're worse than gas-powered cars.

Myth No.2

EVs are worse for the climate than gas cars because of the environmental impact of their batteries

This myth contains a grain of truth that, when taken out of context, can make EVs appear to be more harmful to the environment than they actually are.

While the demand for critical minerals - lithium, cobalt and nickel and others - is surging to build millions of EV batteries, the mining it requires is tiny compared to the amount of fossil fuels currently extracted, according to Hannah Ritchie, a researcher at Oxford University.

"With the right comparison, it's easy to make renewables, electric vehicles and nuclear energy look bad," Ritchie wrote on her blog. "Just frame it as 'low-carbon energy needs millions of tonnes of minerals.' They look bad because they're comparing it to a world of zero impact. But this is not realistic. We can't build low-carbon energy without digging minerals out of the earth. We have to compare it to the problem that we're trying to solve."

There were more than four billion tonnes of oil extracted in 2020, according to the International Energy Agency. But there were only seven million tonnes of critical minerals mined that year.

Even when critical mineral mining scales up to meet future demand, (projections show it will grow to 27 million tonnes by 2040), this is still about 140 times less than current oil production. And 500 to 1,000 times less than all fossil fuel production.

So while the EV revolution will require a small amount of additional mining, it will eliminate huge amounts of fossil fuel extraction, and in the end there will be far less resource extraction needed in a low-carbon economy.

What's more, there's a burgeoning battery recycling industry, which will be able to reuse large amounts of the critical minerals in worn-out EV batteries to make new ones, reducing the need to continuously mine for new batteries.

As for the carbon footprint of an individual EV, it's true that the emissions produced by mining critical minerals and manufacturing the battery make its manufacturing footprint larger than a gas-powered car, by about 25 to 35 per cent.

But numerous studies have shown that because EV emissions are so low during operation, those manufacturing emissions are cancelled out rapidly once you start driving.

"Most of the global warming emissions over the lifespan of a vehicle occur during its use, so the reductions from driving an EV more than offset the higher manufacturing emissions," according to a comprehensive report put out by the Union of Concerned Scientists last year.

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Of course, not all batteries are created equal. Three-quarters of the world's lithium-ion batteries are made in China, where the electricity is mostly coal. However, Tesla's "Gigafactory" in Nevada runs on 100 per cent renewable electricity, significantly reducing the amount of emissions caused by battery manufacturing.

As new cathode and battery plants open in Europe and Canada, where the energy mix is far cleaner than China, EV battery manufacturing emissions will continue to come down.

Myth No.3

You have to drive an EV for many years to compensate for the

additional emissions produced

by its battery manufacturing

Canadians have the highest per capita carbon emissions in the world, thanks to both our cold climate and the long distances we drive. This is made worse because of our propensity to buy big, gas-guzzling SUVs.

More than 80 per cent of new vehicle sales are now minivans, trucks and SUVs, which don't have the same fuel-efficiency standards as cars. This has translated into a new distinction: Canadians drive the least fuel-efficient cars in the world.

At the Star's request, Knobloch ran the numbers for four provinces, two with the cleanest grids and two with the dirtiest, to figure out just how long it would take an EV driver to "break even" on the emissions produced to make their battery.

It's a lot less than you'd think.

In Ontario and Quebec, you'd have to drive less than 9,000 kilometres before your EV has fewer lifetime emissions than a gas-powered car. That would take eight and a half months for the typical driver.

In Alberta and Nova Scotia, where the power is much dirtier, you'd have to drive about 28,000 kilometres, which would take just over two years for the typical driver.

Either way, the more you drive, the faster an EV starts having a real environmental impact, Knobloch said.

EVs are no silver bullet to solving climate change. They still involve mining and steel smelting and other industrial processes that produce emissions. But they are undoubtedly better for the climate than cars that run off fossil fuels, and they will play a big part in the green transition.

But if big, heavy EVs replace small, efficient cars, and they're run on dirty electricity, the climate impact will be blunted. And when it comes to traffic congestion, accidents and wear and tear on the roads, EVs make some problems worse.

"When you really take climate change mitigation seriously, better than getting an EV is not getting a car at all," Knobloch said. "Cycling, public transport or reducing the number of cars is as important as switching to electric cars."

"Someone living in New York City, they might be able to deal without a car. But someone living in the countryside, they need to rely on a car, so they should go electric. The other person should probably transition to the subway."

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As for Kirt Ejesiak, the early adopter in Iqaluit, he was happy to hear that an EV would produce fewer emissions than a gas car, even on his diesel-powered grid. The only problem now? If he gets one, he'll have to book space on the barge, and the first one doesn't leave until July.

Correction

CORRECTION: A Feb. 19 story about electric vehicles incorrectly stated that regenerative braking generates power from friction. In fact, regenerative braking uses kinetic energy from the rotation of wheels to generate electricity. (February 22, 2023, page A2)

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